Name:

at1124exam: Radicals and Squares (v810)

Question 1

Simplify the radical expressions.

$\sqrt{20}$ $\sqrt{27}$ $\sqrt{63}$

$\sqrt{2 \cdot 2 \cdot 5}$ $\sqrt{3 \cdot 3 \cdot 3}$ $\sqrt{3 \cdot 3 \cdot 7}$

$2\sqrt{5}$ $3\sqrt{3}$ $3\sqrt{7}$

Question 2

Find all solutions to the equation below:

$$3(x-5)^2 + 7 \;=\; 55$$

First, subtract 7 from both sides.

$$3(x-5)^2 = 48$$

Then, divide both sides by 3.

$$(x-5)^2 = 16$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 5 = \pm 4$$

Add 5 to both sides.

$$x = 5 \pm 4$$

So the two solutions are $x = 9$ and $x = 1$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 10x = -16$$

$$x^2 + 10x + 25 = -16 + 25$$
$$x^2 + 10x + 25 = 9$$
$$(x+5)^2 = 9$$
$$x + 5 = \pm 3$$
$$x = -5 \pm 3$$
$$x = -2 \quad \text{or} \quad x = -8$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 2x^2 + 24x + 63$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 + 12x) + 63$$

We want a perfect square. Halve 12 and square the result to get 36 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 + 12x + 36 - 36) + 63$$

Factor the perfect-square trinomial.

$$y = 2((x+6)^2 - 36) + 63$$

Distribute the 2.

$$y = 2(x+6)^2 - 72 + 63$$

Combine the constants to get **vertex form**:

$$y = 2(x+6)^2 - 9$$

The vertex is at point $(-6, -9)$.